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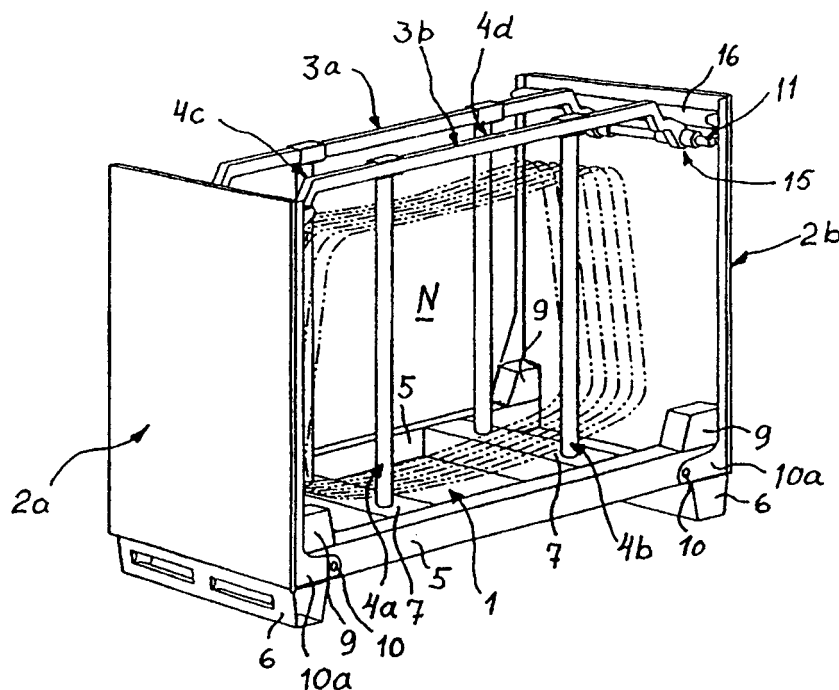
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## (57) Abstract

The invention relates to a transport rack for bent glass sheets or the like. The transport rack comprises a base (1), on which the glass sheets can be placed in the form of a bundle (N). Vertical elements (2a, 2b) extend upwards from two edges of the base, articulated (10) onto the base. The vertical elements (2a, 2b) are connected at the upper part of the transport rack by two horizontal supports (3a, 3b). One or several intermediate supports (4a - 4d) can be placed between the base (1) and the horizontal supports (3a, 3b).

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## TRANSPORT RACK

The invention relates to a transport rack for bent glass sheets or the like. The transport rack comprises a substantially rectangular horizontal base, on which glass sheets or the like can be placed in the form of a bundle, and vertical elements extending upwards from the edges of the base, used as means for protecting, binding, piling and/or supporting, wherein two vertical elements are placed at opposite edges of the base, and wherein the vertical elements are articulated at their lower parts against the base to be pivotable from their substantially vertical operational position to be substantially parallel to the base, above the same, in the non-operational position.

From DE-4129058, a transport rack is known which is intended particularly for transportation of single glass sheets. For this purpose, the transport rack is equipped with a clamping arrangement, whereby each single glass sheet is clamped between the support beams of the transport rack. The vertical parts of the transport rack are arranged to be pivotable at their lower part, but there is no horizontal support arrangement used in the entire transport rack, which makes it very difficult to use the rack for transportation of glass sheets or the like in bundle form.

As to the prior art, reference is also made to the publications US-4,010,849 and EP-216690. From these publications, particularly from US-4,010,849, a shipping rack for bent glass sheets is known having a base element and horizontal supports extending upwards from the edges of the rectangular base. The rearmost fixed vertical supports are further provided with vertical locking devices on a solid horizontal support, which are used for fixing a bundle of bent glass sheets by belts to the transport rack. In the front

section of the shipping rack, two vertical supports are provided at the edges of the base, which are pivotable in alignment with the base. In any case, the shipping rack has an L-form when seen from the side also in the non-operational position, which makes it more difficult to handle the rack and increases the requirement for storage space. Further, the shipping rack with a full steel structure is very heavy, thus adding to the transportation costs by the high tare weight. Corresponding disadvantages apply also to the publication EP-216690.

The purpose of the invention is to present a new type of a transport rack, with the particular purpose of improving the techniques of transporting bent glass sheets in bundle form. In particular, the structure of the transport rack allows for the varying size of bundles of glass sheets to be transported, whereby the transport rack can be modified to be suitable for the respective bundle by a very simple operation. Further, the structure allows for a non-operational position of the transport rack so that the rack can be made substantially compact for intermediate storage and return transportation. It is known that transport racks for bent glass sheets circulate between manufacturers and users for as long as several years. Consequently, particularly the tare weight of the transport racks and the space required in the non-operational position are important factors for optimizing the costs needed for transportation. For achieving the above-mentioned purposes, the transport rack of the invention is primarily characterized in that

- the transport rack comprises further at least one horizontal support known as such, connecting the vertical elements substantially at the upper part of the transport rack substantially in the vertical

operational position of the vertical elements, and that

- 5                   - for positioning the glass sheets or the like in a bundle form according to their dimensions, each element and said at least one horizontal support is provided with first and second locking means for achieving a releaseable locking between at least one vertical element and the horizontal support.
- 10

Thus, the structure presented above provides a transport rack, in which the vertical elements, pivotable to a non-operational position, can be locked by at least one horizontal support so that the transport rack forms a substantially rigid unit. By removing said at least one horizontal support from the operational position, by placing it on the bottom of the base, and by turning the vertical elements to the non-operational position, it is possible to reduce the requirement for total space of the transport rack in its non-operational position into a fraction of that in the operational position.

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25           Some advantageous embodiments of the transport rack of the invention are presented in the following dependent claims.

30           In the following description, the transport rack of the invention will be illustrated further with reference to the appended drawings. In the drawings,

35           Fig. 1           shows a perspective view of an embodiment of the transport rack of the invention in the operational position,

          Fig. 2           shows a perspective view of the joint of

the vertical element and the horizontal support in an enlarged scale,

5           Fig. 3           shows a perspective view in an enlarged scale of, firstly, the locking arrangement of the lower part of an intermediate support in connection with the base and, secondly, the locking arrangement between the intermediate support and the upper part in connection with the horizontal support, and

10           Fig. 4           shows a side view of three transport racks of Fig. 1 piled on top of each other so that the two upper racks are in the operational position and the lowermost rack is in the non-operational position.

20           With reference to Fig. 1, the transport rack of the invention comprises as main parts a base 1, which is substantially rectangular; two preferably plate-like vertical elements 2a, 2b, which are parallel to the opposite, preferably shorter sides or edges of the base and have substantially the same width as said edges so that the direction of width of the vertical elements 2a, 2b is said direction of the base 1; at least one horizontal support (two supports 3a, 3b in the present embodiment shown in Fig. 1) connecting the vertical elements 2a, 2b in the upper part of the transport rack and at least one substantially vertical intermediate support (four supports 4a, 4b, 4c, 4d in the embodiment shown in Fig. 1), placed between the horizontal supports 3a, 3b and the base 1.

35           The base 1 is a plate-like form piece, whose longer edges, connecting the vertical elements 2a, 2b, are provided with overhead supporting beams 5. Further, underneath the bottom of the base 1, at the ends of the rack, two supporting runners 6 are provided

extending substantially in the direction of width of the vertical elements 2a, 2b, against the same. By means of the supporting runners 6, the bottom of the base 1 is raised from the floor surface or the like so that the transport rack is accessible by a working machine, particularly a forklift truck, whereby the fork of the forklift truck can be placed underneath the bottom of the base 1. Further in the present embodiment shown in Fig. 1, the base 1 comprises two beams 7 or the like extending in the direction of width of the vertical elements and placed preferably on the bottom of the base. They comprise a series of holes 8 for receiving the lower part 19 of the rod-like intermediate support 4a-4d, functioning as a series of locking means arranged in the longitudinal direction of the beam 7. Further, the base 1 comprises platform pieces 9 or the like against each vertical element 2a, 2b, the upper surface of the pieces 9 being exposed particularly when the vertical elements 2a, 2b are folded in the non-operational position substantially parallel to the base. Thus the platform pieces 9, preferably placed on top of the support beams 5, can receive another transport rack to be placed on top of said transport rack, as shown in Fig. 5.

The vertical elements 2a, 2b are pivoted with joints 10 onto the side surfaces of the support beams 5 by means of lugs 10a. The lugs 10a are, in turn, fixed onto the side surfaces of the vertical elements 2a, 2b. The upper part of each element 2a, 2b is provided with first locking means 11 shown particularly in Fig. 2 and forming a series of substantially horizontal locking means 11a, whereby the locking point of the horizontal supports 3a, 3b can be elected substantially according to the dimensions of the bundle N to be transported in the direction of width of the vertical elements 2a, 2b. The locking means 11a are placed in a longitudinal rod fixed on the inner wall of said

vertical elements 2a, 2b. The locking means 11a are formed of notches arranged e.g. at regular intervals in the longitudinal direction of the tubular rod.

5       The horizontal support 3a, 3b is provided with a spring-loaded 12 locking cam 13 (forming second locking means 15) pivoted with joint 14 and placed into one of the grooves of the locking means, locking the support part 14 by a jaw-like locking in the respective  
10       position. Above the first locking means 11, each vertical element 2a, 2b is provided with the inwards directed horizontal flange 16 of the transport rack. It is intended for receiving the supporting runner 6 of a transport rack to be placed on top of the transport rack in question, as shown particularly in Fig. 5.  
15       To maximize the freely available volume inside the transport rack, the horizontal support 3a, 3b comprises a central horizontal element 17 extending substantially in the horizontal direction in the plane of the upper  
20       edge of the vertical element 2a, 2b in the operational position of the transport rack. At the ends of the horizontal element, the horizontal support extends diagonally downwards as end parts 18 equipped with second locking means 15.

25       The upper part of each intermediate support 4a-4d is provided with a U-formed locking means 20 extending horizontally in the operational position (Fig. 3), whereby the horizontal support 3b is arranged to be  
30       placed inside the U form in the operational position of the intermediate support 4a. Both the beams 7 and the intermediate supports 4a-4d are equipped with protective and damping layers 21, 22 on the outer surface, for protecting the bundle N of bent glass  
35       sheets. The bundle N is supported between the intermediate supports, whereby also other intermediate supports can be provided between partial bundles in a bundle comprising several sizes; i.e. three or more



horizontal supports, against which the intermediate supports are supported, can be provided according to the bundle structure. The protective layer 22 of the beams 7 is further equipped with cuttings, e.g. cross cuttings 23, against the holes 8, for bringing the lower part 19 of the rod form, functioning as locking means, of the intermediate supports 4a-4d through the protective layer 22 in connection with the holes.

Figure 5 shows three transport racks of the invention placed on top of each other. The lowermost transport rack is in the non-operational position, whereby its end elements 2a, 2b are bent above the base substantially parallel to the main plane and the longer edges of the base 1. The end elements 2a, 2b are placed partly on top of each other. The platform pieces 9 of the lowermost transport rack are exposed when the lugs 10a remove the lower part of the vertical elements during their revolution from the location of the platform pieces. Thus the platform pieces 9 can receive the rack shown in the middle in Fig. 5 on top of the lowermost rack in the non-operational position,

whereby the supporting runners 6 are placed on the platform pieces 9. The middle transport rack is in the operational position, whereby the horizontal flanges 16 in the upper part of each vertical element 2a, 2b can receive the supporting runners 6 of a third transport rack placed uppermost in the pile shown in Fig. 5. As shown in Fig. 5, the end part 18 of the horizontal supports 3a, 3b has an angular form so that the support runner can be placed on its entire width in connection with the lowermost transport rack. As further shown in Fig. 5, the vertical elements 2a, 2b of the lowermost transport platform in the non-operational position are positioned so that a space T is left between their upper surfaces and the bottom of the base 1 of the middle transport rack in the pile, particularly for placing the fork of a forklift truck between the lowermost and the middle transport racks. A corresponding situation is shown also between the middle and the uppermost transport rack. The height of the supporting runners 6 is so dimensioned that the upper surface of the intermediate supports 3a, 3b are in a lower plane than the bottom of the base 1, whereby a corresponding space T is formed between said two racks for the fork of a forklift truck.

It is advantageous that the base 1 and the vertical elements are manufactured of a wood-based plate structure, preferably fibre board, reinforced with a spike plate. Thus a sufficiently strong and yet lightweight transport rack is obtained. The horizontal supports 3a, 3b as well as the rod-like inner part of the intermediate supports 4a-4d can be manufactured of a suitable metal material, e.g. steel. In the protective and damping layers, suitable cellular plastic can be used. In some embodiments, the locking means 11, 15 can also be placed in connection with one vertical element only, whereby e.g. a horizontal support with a telescopic extension is e.g. articulated in connection with the opposite vertical support.

Claims:

1. Transport rack for bent glass sheets or the like, wherein the transport rack comprises a substantially rectangular horizontal base (1), on which glass sheets or the like can be placed and vertical elements (2a, 2b) extending upwards from the edges of the base, used as means for protecting, binding, piling and/or supporting, wherein
- two vertical elements (2a, 2b) are placed at opposite edges of the base, and wherein
- the vertical elements (2a, 2b) are articulated at their lower parts against the base (1) to be pivotable from their substantially vertical operational position to be substantially parallel to the base (1), above the same, in the non-operational position,
- characterized in that
- the transport rack comprises further at least one horizontal support (3a, 3b) known as such, connecting the vertical elements (2a, 2b) substantially at the upper part of the transport rack substantially in the vertical operational position of the vertical elements, and that
- for positioning the glass sheets or the like in a bundle form (N) according to their dimensions, each element (2a, 2b) and said at least one horizontal support (3a, 3b) is provided with first and second locking means (11, 15) for achieving a releaseable locking between at least one vertical element (2a, 2b) and the horizontal support (3a, 3b).

2. Transport rack according to claim 1, **characterized** in that the vertical elements (2a, 2b) are plate-like, preferably rectangular, and that they are placed at the shorter edges of the rectangular form of the base (1).

3. Transport rack according to claim 1 or 2, **characterized** in that the first locking means (11) preferably in connection with the vertical elements (2a, 2b) are formed into a series of substantially horizontal locking means (11a), wherein the locking point of the horizontal supports (3a, 3b) can be elected and the horizontal support (3a, 3b) can be locked by the second locking means (15) substantially in the direction of width of the vertical elements (2a, 2b) according to the dimensions of the bundle form (N) to be transported.

4. Transport rack according to any of claims 1 to 3, **characterized** in that at least one substantially vertical intermediate support (4a-4d) is provided between at least one horizontal support (3a, 3b) and the base (1), having locking means (19, 20) at its upper and lower parts for locking the intermediate support (4a-4d) releaseably to the transport rack.

5. Transport rack according to any of claims 1 to 4, **characterized** in that the base (1) comprises a series of attaching means (8) for receiving the intermediate support (4a-4d), wherein the series is placed substantially in the direction of width of the vertical element (2a, 2b) for the purpose of placing the intermediate support (4a-4d) in the vertical position at the point of placement of said horizontal support (3a, 3b).

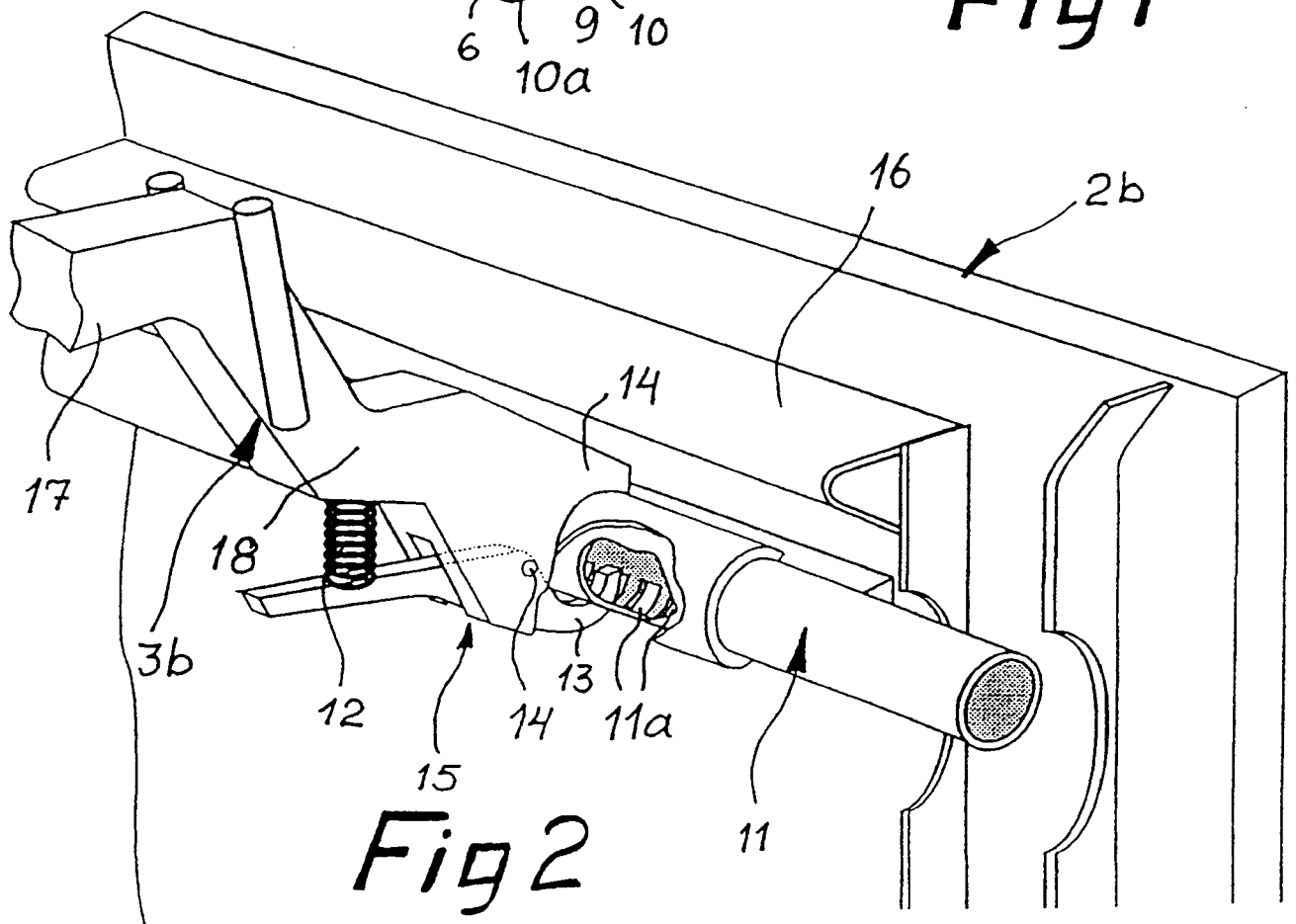
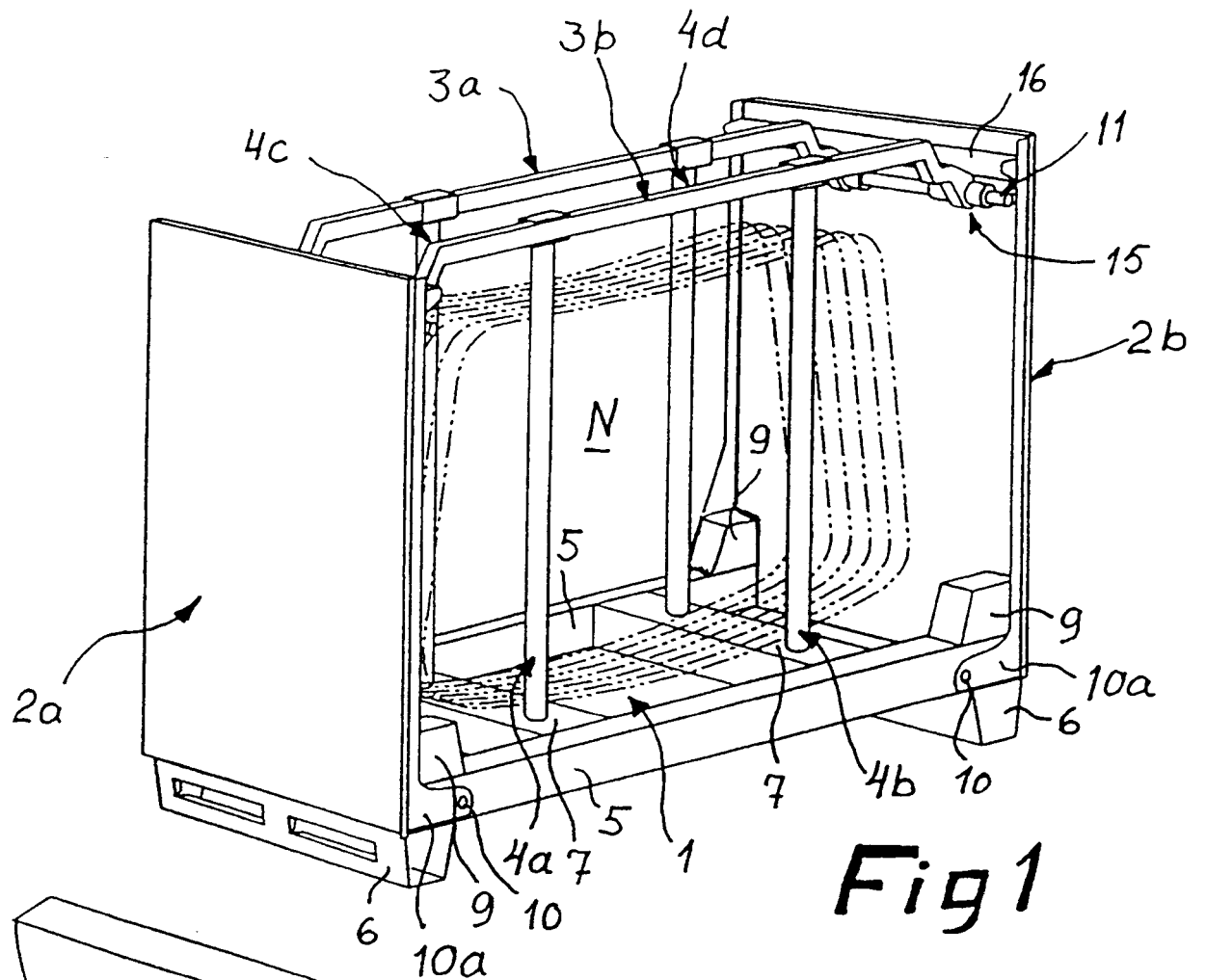
6. Transport rack according to claim 5, characterized in that the base (1) is provided with a series of holes (8) functioning as attaching means arranged in a beam (7) or the like preferably on the base (1), and that the upper part of the intermediate supports (4a-4d) is provided with a preferably U-formed attaching means (20), wherein the horizontal support (3a, 3b) is arranged to be placed inside the U-form in the operational position of the intermediate support (4a-4d), the beam (7) or the like and the intermediate support (4a-4d) being equipped with protective and damping layers (21, 22) on the outer surface of said parts.

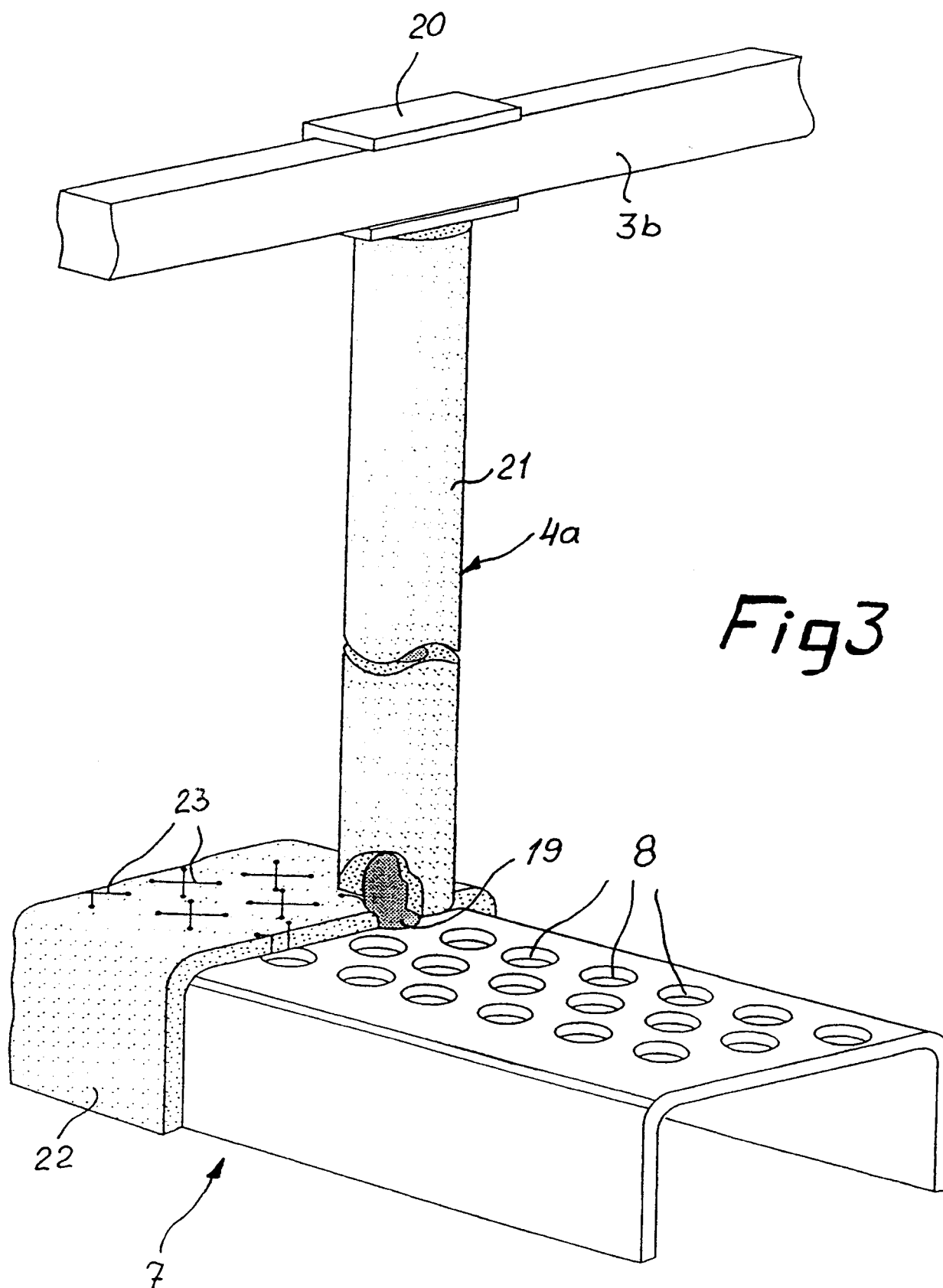
7. Transport rack according to any of claims 1 to 6, characterized in that the upper part of the vertical elements (2a, 2b) is equipped with an inwards directed horizontal flange (16) or the like of the transport rack, for receiving the supporting runner (6) of a second transport rack, that the first locking means (11) are placed underneath a horizontal flange (16) or the like, and that the horizontal support (3a, 3b) comprises a horizontal element (17) to be placed substantially in the horizontal direction at the level of the upper edge of the vertical element (2a, 2b) and end parts (18) of the horizontal support extending diagonally downwards from the horizontal elements, from both ends thereof, equipped with second locking means (15).

8. Transport rack according to any of claims 1 to 7, **characterized** in that platform pieces (9) or the like are provided against each vertical element (2a, 2b) in the direction of width of the vertical elements (2a, 2b), and that the vertical elements (2a, 2b) are arranged in the non-operational position to be placed aside from the platform pieces (9) or the like in order to receive the supporting runner (6) or the like of the second transport rack to be placed above the transport rack placed in the non-operational position, wherein the vertical elements (2a, 2b) are placed in the non-operational position so that a space (T) is left for the fork of the handling device, e.g. a forklift truck, between the vertical elements (2a, 2b) and the bottom of the base (1) of the second transport rack placed above the transport rack in the non-operational position.

9. Transport rack according to any of claims 1 to 8, **characterized** in that the base (1) and the vertical elements (2a, 2b) are manufactured of a wood-based plate structure, preferably a fibre plate, reinforced with a spike plate.

10. Transport rack according to any of claims 1 to 9, **characterized** in that the vertical elements (2a, 2b) are articulated onto the base (1) by means of lugs (10a), wherein the point of articulation (10) is substantially in the field of the base (1).







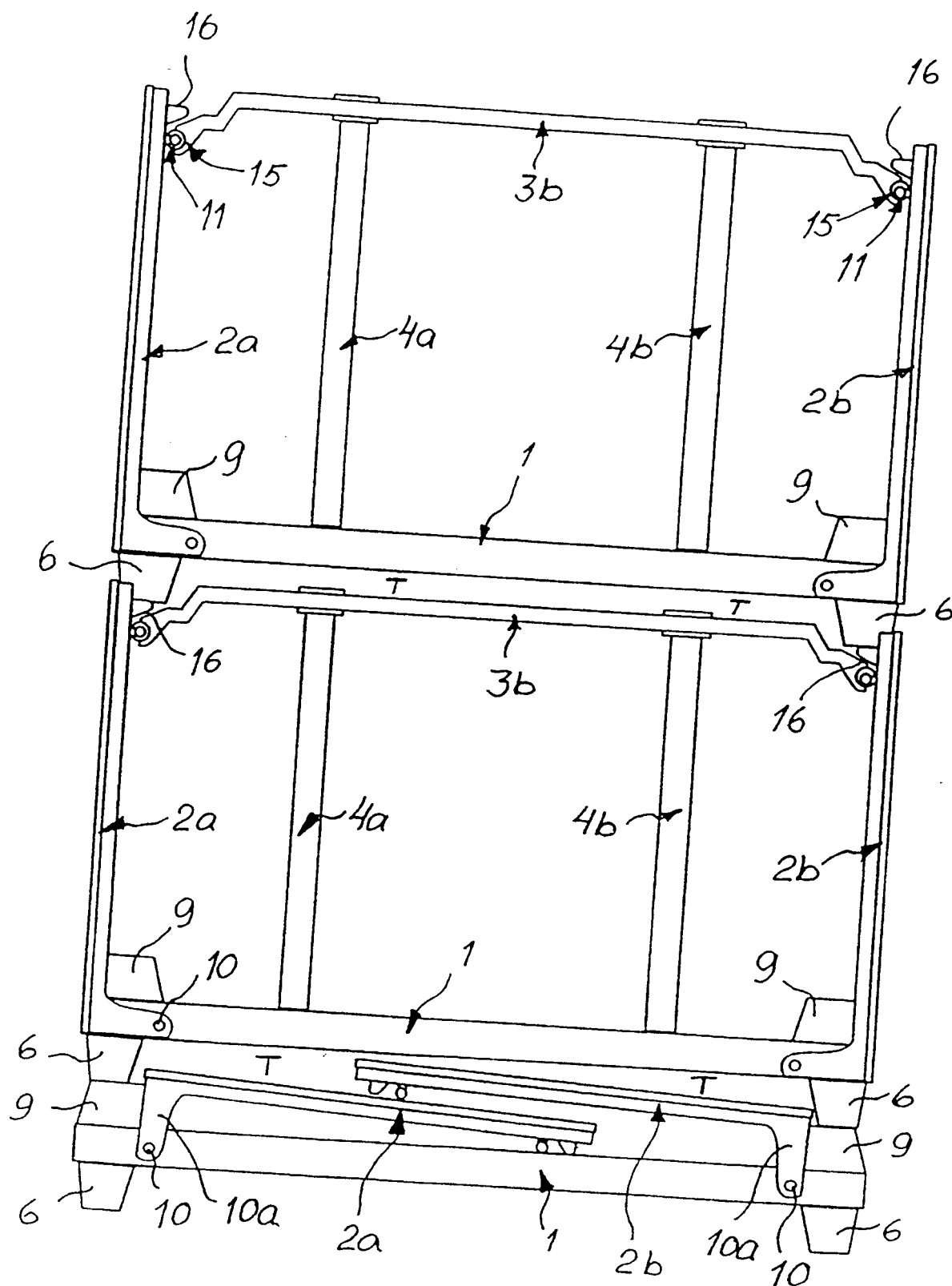


Fig 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 94/00174

## A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B65D 85/47

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Patent Abstracts of Japan, Vol 14, No 378, M-1011, abstract of JP, A, 2-139344 (NATL HOUSE IND CO LTD), 29 May 1990 (29.05.90) --	1,2
X	US, A, 2686646 (M.H. MC MILLAN), 17 August 1954 (17.08.54), column 2, line 53 - column 3, line 3, figures 1-3 --	1,2
X	US, A, 3405665 (D.M. SLONIM), 15 October 1968 (15.10.68), column 2, line 38 - line 55, figures 1, 2 --	1,2

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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International application No.

PCT/FI 94/00174

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DE, B, 1043952 (ADAM OPEL AKTIENGESELLSCHAFT),  13 November 1958 (13.11.58), column 4,  line 3 - line 21, figure 1</p> <p style="text-align: center;">--  -----</p>	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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Information on patent family members

27/08/94

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 2686646	17/08/54	NONE	
US-A- 3405665	15/10/68	DE-A- 1586907 GB-A- 1184212	24/09/70 11/03/70
DE-B- 1043952	13/11/58	NONE	